

AMENDMENTS TO THE DRAWINGS

A replacement FIG. 4 is provided herewith in order to correct the errors in numeric labeling between the figure and references in the specification as originally filed.

Attachment: Replacement Sheet

REMARKS

Claims 18-25, 32-42, and 47-50 are pending in the present application. Applicants appreciate the Examiner's allowance of claims 18-22 and 47-50. Applicants have addressed objections to claims 38-42 and rejections of claims 23-25 and 32-37 as described below. Amendments to the specification (missing equations) and drawings (errors pointed out by Examiner) are also provided herewith. Applicants believe these do not introduce new matter, and serve only to correct typographical errors on matter that was properly present in the parent application. New claims 66-82 have been added.

Amendments to the Drawings

A corrected FIG. 4 is provided herewith in order to correct the errors in numeric labeling between the figure and references in the specification as originally filed.

Amendments to the Specification

It appears that the specification was filed using a printout from a word processor where the printer was unable to render the equations in the word processor document. As a result, in the application as originally filed, several equations were replaced by blank rectangles. Almost all of these equations were properly displayed in the parent application (SN 10/277,307) to this continuation-in-part application. Only equations 14A and 14B were not present in the parent application and constitute equation matter that is additional to what was present in the parent application. Equations 14A and 14B are parallel to Equations 3A and 3B that are properly displayed in the present application as originally filed, and simply provide additional explanation of Equation 14. Therefore, Applicants believe no matter is being added by these amendments to the specification that impact the priority date of any invention as claimed herein. These amendments merely correct typographical errors (all insertions except eqs. 14A and 14B) and provide additional clarification (eqs. 14A and 14B) to what was already present in the application, and its parent, as filed.

Rejections Under Section 102(a)

Claims 23-25 and 35-37 stand rejected under 35 USC 102(a) as anticipated by US Publication 2002/0152056 to Herzog et al. Applicants assert that this reference is not 102(a) prior art to the present application. Further, not all elements of the claims are anticipated by the reference.

The Examiner has cited US Publication 2002/0152056 to Herzog et al. (US App. SN 09/791,046) as 102(a) prior art against the present application. The Herzog et al. publication was published October 17, 2002. The present application is a continuation-in-part of US App. No. 10/277,307, filed October 22, 2002, which is a continuation-in-part of US App. No. 09/832,166, filed April 10, 2001. The claims herein are supported by disclosure in the parent-parent application, US App. No. 09/832,166, which predates the publication of the cited Herzog et al. reference. This invention was therefore invented prior to the publication of the cited reference.

Furthermore, the inventors of the Herzog et al. reference are James Herzog and Stephan Wegerich, both employees with the assignee of the present application. Mr. Wegerich is an inventor of the present invention, and thus common to both applications. The cited Herzog et al. reference is also a patent application assigned to the present assignee by Mssrs. Herzog and Wegerich. Mr. Herzog and Mr. Wegerich have worked together as researchers at the present assignee corporation since before the filing date of either the Herzog et al. reference or the present application and its parent applications. Attached hereto is an affidavit executed by both Mssrs. Herzog and Wegerich (the inventors of the cited alleged prior art) that states that the presently pending claims of the present application were invented by their inventors before any "other" person associated with the Herzog et al. reference knew, used or patented the invention. To the extent that the disclosure of the Herzog et al. reference includes the presently claimed invention (which is contested below), therefore, it was not "known or used by others ... before the invention thereof by the applicant for patent." (102(a)). Mr. Wegerich is common to both the Herzog et al. reference and the present application, and therefore is not an "other" for purposes of 102(a). Mr. Herzog is not a currently named inventor of the present claims, but did not know, use or patent the claimed invention prior to the invention thereof by the named inventors.

Accordingly, the Herzog et al. reference does not constitute 102(a) prior art because it does not evidence that “the invention was known or used by others [i.e., the Herzog et al. inventors who are not inventors of the present invention] in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent.”

However, even if the Herzog et al. reference were prior art, it would fail to anticipate the present claims. Turning first to currently pending claim 23, applicants concur with the Examiner that Herzog et al. teaches the step of comparing for similarity monitored parameter data from a monitored system to reference parameter data characteristic of known behavior of the system; and the step of generating estimates of the monitored data based on the similarity comparison; and the step of generating alerts in response to a comparison of said estimates to said monitored data. However, Herzog et al. does not teach the step of identifying an impending failure mode in said system *by matching said parameter alerts with at least one reference alert pattern* associated with said failure mode. A failure mode is a diagnosis associated with a root cause. Merely alerting, or even making a filtered decision to alert, is not the same as matching a failure signature to a known mode of failure, which is claimed in claim 23. In Herzog et al., the disclosure stops short of defining a method for mapping an alert pattern to any kind of failure mode – only alerts are generated. The phrases “failure mode”, “mode”, “diagnosis” and “root cause” all do not exist in Herzog et al. The sole occurrence of the word “diagnostics” in Herzog et al. occurs in paragraph 80, where the idea of outputting similarities to unspecified diagnostics is entertained. This is not the same as the diagnosis of a failure mode in the current claim 23 by matching the alerts to a *stored pattern* associated with a failure mode.

Claim 24 specifies that the alerts are generated by SPRT. Claim 25 specifies the alerts are generated by a threshold exceedance. While both of these are contemplated in Herzog et al., it is only with respect to providing alerts, not with respect to the step of interpreting the pattern of alerts by matching to a stored alert *pattern*.

Therefore claims 23-25 are not anticipated by Herzog et al.

Turning to claims 35-37, a computer program product for diagnosing faults is claimed. While Applicants contend that Herzog et al. does not anticipate claim 35 as originally filed because Herzog et al. do not teach a fault pattern detection program module, claim 35 has been

amended to incorporate the element(s) of dependent claim 38 (which was indicated to be allowable by the Examiner). Claim 38 has been cancelled. Claims 39 and 42 have been amended to depend from claim 35. Claim 35 has been additionally amended to more appropriately claim a computer program product according to current USPTO practice, and all of claims 35-37 and 39-42 should be in condition for allowance.

Rejections Under Section 103

Claims 32-34 have been rejected under 35 USC 103(a) as being unpatentable over Herzog et al. in view of US Patent No. 6,393,373 to Duyar et al. As described above, Herzog et al. is not section 102(a) prior art to the present application, and so it cannot be the basis of an obviousness rejection under section 103. Applicants believe therefore that claims 32-34 are not obvious in view of any prior art.

Furthermore, even if Herzog et al. were prior art, Applicants point out that nothing in Herzog et al. teaches the step of claim 32 of comparing for similarity the *residual data* to reference residual data associated with a known failure mode as a diagnostic indication of that failure mode. Herzog et al. do teach comparing raw system data with reference data of normal system behavior using similarity, for purposes of generating estimates; and Herzog et al. do teach differencing the estimates with the raw system data to produce residuals. But Herzog et al. do not teach then performing *another* similarity comparison on *that residual data* vis-à-vis another store of reference data comprising reference *residual data*, in order to determine failure mode. Thus, claim 32 effectively calls for two sets of reference data, the first being the “reference parameter data” for use in generating *estimates*, and the second being “reference residual data” for identifying the failure mode. This second set of reference data is not taught in Herzog et al., nor is the comparison of such data to residuals generated from the estimates for purposes of failure mode identification.

Regarding Duyar et al., this is a more conventional approach known in the prior art, whereby a tuned first principles model of a system is used as a comparative baseline for detecting performance discrepancies. In Duyar et al., differential equations that mathematically relate measured aspects of electric motors according to known physical principles are tuned using a fault free motor, and then this is used as a performance baseline for comparing motors

during monitoring. The first-principles modeling approach of Duyar et al. is entirely different from the nonparametric empirical estimation model of the claims and in particular claim 32. In claim 32, measured data are processed through a similarity comparison to reference data, in order to generate estimates, as is characteristic of the nonparametric kernel-based empirical modeling described in the present application. In contrast, the differential equations of Duyar et al. do not perform similarity comparisons upon which estimates are based; instead, the estimate of what certain motor parameters should be is based on inputting driver parameters to the tuned first-principles model to get calculations of driven parameters. Similarity is never contemplated as a basis for generating an estimate. Furthermore, Duyar et al. do not contemplate performing a similarity comparison between generated residuals and reference residuals.

Therefore, claim 32 and its dependent claims 33 and 34, would not be made obvious by a combination of Herzog et al. in view of Duyar et al., even if Herzog et al. were in the prior art.

New claims

New claims 66-82 have been added as dependent claims. These are supported in the specification, particularly with reference to FIG. 17, which shows these three modes of mapping a failure alert pattern to a stored pattern for determination of a corresponding failure mode. Support for claim 69 is found at page 17, line 5 onward, among other locations. Support for claims 73, 75, and 79 is found at page 25, line 16 onward. Support for claim 74 is found at page 30, line 24, among other locations.

Conclusion

Applicants believe the claims as amended are in condition for allowance. Amendments to the specification are mainly for correction of typographical errors of content already part of the parent application(s). New claims are supported in the specification as filed. An affidavit is supplied concerning art cited by the Examiner which should suffice to remove the citation from the prior art. The claims are neither anticipated by the art of record nor made obvious by it. Allowance of the claims is respectfully requested.

Respectfully submitted,
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